ELV LAUNCH SERVICES INFORMATION SUMMARY (Updated 16 March, 2001)

ELV Launch Services Groundrules/Policy

Expendable Launch Vehicles (ELV) will be procured and provided by NASA under the NASA Launch Services (NLS) contract. NASA's fixed price launch services contracts include the provision of ELV integration, analysis, and post-flight mission data evaluation, in addition to placement of spacecraft into a designated orbit. NASA also provides technical management of the launch service, coordinates and approves mission-specific integration activities, and provides payload-processing accommodations.

All launch services to be used for missions under this AO are to be consistent with NASA Policy Directive (NPD) 8610.7, NASA Launch Services Risk Mitigation Policy. Expendable launch services acquired from NASA will be managed in accordance with NPD 8610.23, Technical Oversight of Expendable Launch Vehicle (ELV) Launch Services. These NPD's can be accessed through the URLs:

http://nodis.hq.nasa.gov/Library/Directives/NASA-WIDE/Policies/Program_Management/N_PD_8610_7.html

http://nodis.hq.nasa.gov/Library/Directives/NASA-WIDE/Policies/Program_Management/N_PD_8610_23A.html

Both the Delta IV and Atlas V (EELV) class vehicles are still in development and have not yet flown. As a consequence, there exist uncertainties regarding development schedules, readiness dates, and demonstrated successful flight. Because of the uncertainty in the EELV development schedule and projected demonstrated launch rate, it is recommended that dual compatibility between the Delta and Atlas families of ELVs be maintained as far into development as practical, at least until first flight of each vehicle configuration. The EELV-Heavy launch vehicle (Delta IV-Heavy) is projected to have a lower flight rate than the EELV-Medium launch vehicles. Likely lower demonstrated flight rate for this configuration will be factored into the total risk of the mission.

Launch Vehicle Configuration/Performance

The Offerors should select the minimum ELV configuration(s) that meets their requirements including adequate performance margins. The performance curves (Figures 1-4) reflect the NLS contractual commitments for the ELV (1^{st} and 2^{nd} stages) for an Eastern Test Range launch as well as best estimate performance for upper stages to be considered for proposers responding to this AO. The Offeror should state specifically in the proposal which ELV configuration(s) meet their requirements for this mission.

The NLS contract does not offer a 3^{rd} stage (kick-stage) as an option on any of the LVs mentioned in this AO and thus it is assumed that the kick-stage will be the responsibility of the Offeror. However, it is feasible to procure a kick-stage through the NLS Contract as a mission-unique modification. Since this would require a significant development effort to qualify this stage for flight on a NASA mission, the Launch Service cost figures shown do **not** include the

procurement or development effort and must be priced separately in the proposal. For reference, two of the four sets of LV performance curves provided include performance for a Star 48V kick-stage; however, the Offerors are not constrained to this configuration and other kick-stages can be proposed.

Launch Service Costs

For purposes of this AO only, the NLS Launch Vehicles have been consolidated in three classes of Launch Services; Intermediate, EELV-Medium, and EELV-Heavy. Table 1 provides Launch Service cost figures for each of the noted Launch Service classes. Based on the Offeror's selection of the individual ELV configuration(s) that meet their technical requirements, the Offeror should use the respective Launch Service class dollar figures in the overall mission cost.

Funding estimates are stated in real-year dollars and assume a launch in December 2004. The cost estimate for launches in years later than 2004 may be calculated by applying the proper inflation indices. The funding profiles provide for the launch service, nominal allocation for mission unique launch vehicle modifications/services, mission integration, launch site payload processing, telemetry support, and the mission unique modification and support required for nuclear materials. These cost figures do NOT include the cost for development/procurement of a Kick-stage (if required).

Mission Integration Schedule

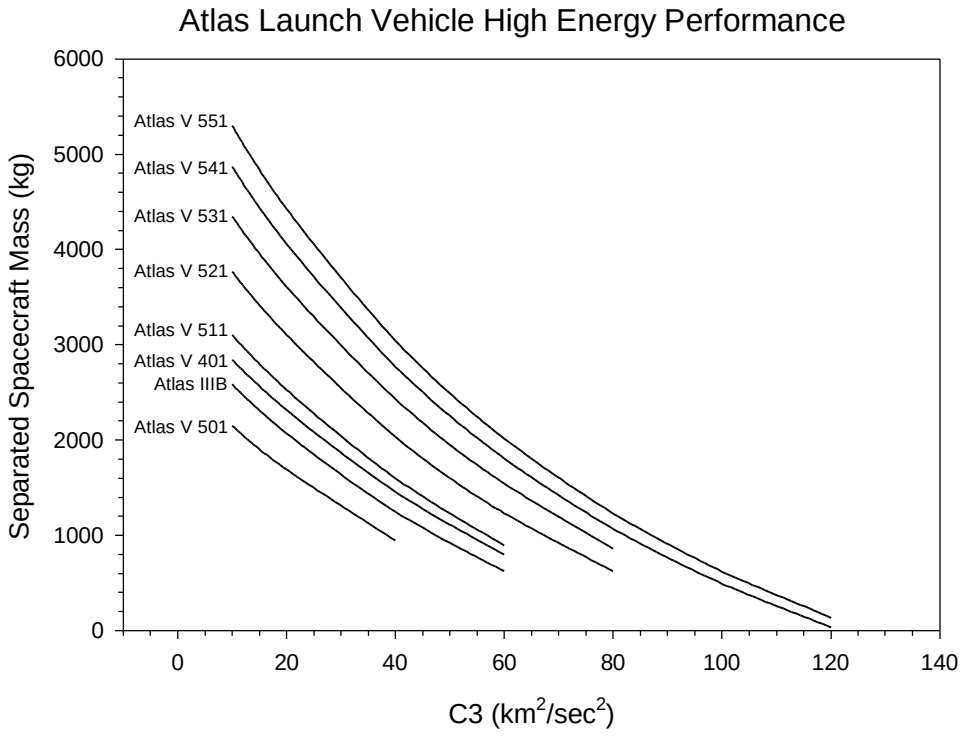
Figure 5 shows integration activities for a typical Intermediate/ EELV Medium or Heavy class LV mission.

NASA ELV Launch Services Point of Contact for Additional Information

Additional information including, but not limited to, availability of smaller launch vehicles, performance quotes, mission integration inquiries and costs may be obtained from:

Darrell Foster
Mission Integration Manager, Advanced Planning
NASA/Kennedy Space Center/ELV Launch Services
Code VB-C
Kennedy Space Center, FL 32899

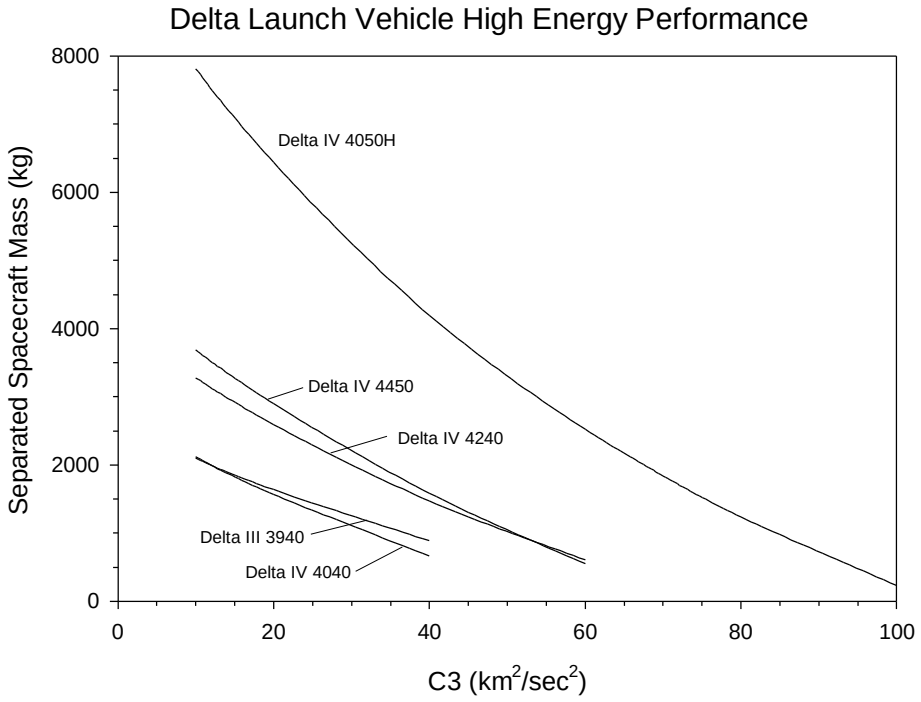
Phone: 321-476-3622
Email: Darrell.Foster-1@ksc.nasa.gov



Ground Rules

- Performance is expressed in terms of separated spacecraft mass per the generic ground rules defined in the NLS contract and summarized here.
- Performance shown is intended for planning purposes only. Actual performance will depend heavily on mission specific requirements. These data do not represent a mission specific contractual commitment.
- Performance shown reflects 3 sigma mission performance margin, plus additional reserves as determined by the launch service provider. No NASA/KSC reserves, or any other mission specific reserves (i.e., launch window), have been applied.
- These data are valid for declinations between –28.5° and 28.5°. Declinations outside this range will result in a performance loss.
- Payload adapters:
    - Atlas IIIB and Atlas V 401: Type B2
    - Atlas V 5X1: Type B2 plus type C2 spacer
- Payload fairings:
    - Atlas IIIB: 4 m Large Payload Fairing (LPF)
    - Atlas V 401: 4 m Extended Payload Fairing (EPF)
    - Atlas V 5X1: 5 m Short Payload Fairing (C-SPF)

Figure 1: Launch Vehicle Performance- Atlas III/V Family w/o Kick-stage



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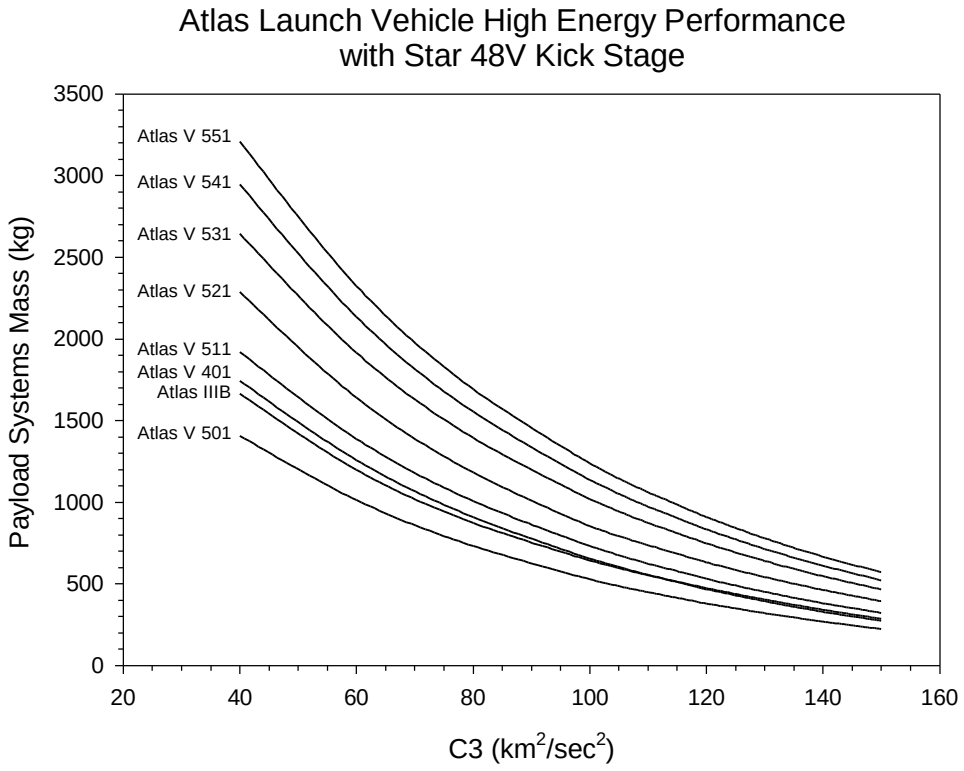
- These data are valid for declinations between –28.7° and 28.7°. Declinations outside this range will result in a performance loss.
- Payload adapters:
    - Delta III 3940: 1666-4
    - Delta IV 4040 and 4240: 1194-4
    - Delta IV 4450 and 4050H: 1194-5
- Payload fairings:
    - Delta III 3940: 4 m x 11 m
    - Delta IV 4040 and 4240: 4 m X 12 m
    - Delta IV 4450: 5 m x 14 m
    - Delta IV 4050H: 5 m x 19 m
- Delta IV has not been structurally analyzed for some missions. Performance in the following C3 ranges is subject to revision upon completion of appropriate structural analysis.
    - Delta IV 4040: C3 > 30 km^2/sec^2
    - Delta IV 4240: C3 > 10 km^2/sec^2
    - Delta IV 4450: C3 > 25 km^2/sec^2
    - Delta IV 4050H: C3 > 60 km2/sec2

Figure 2: Launch Vehicle Performance- Delta III/IV Family w/o Kick-stage

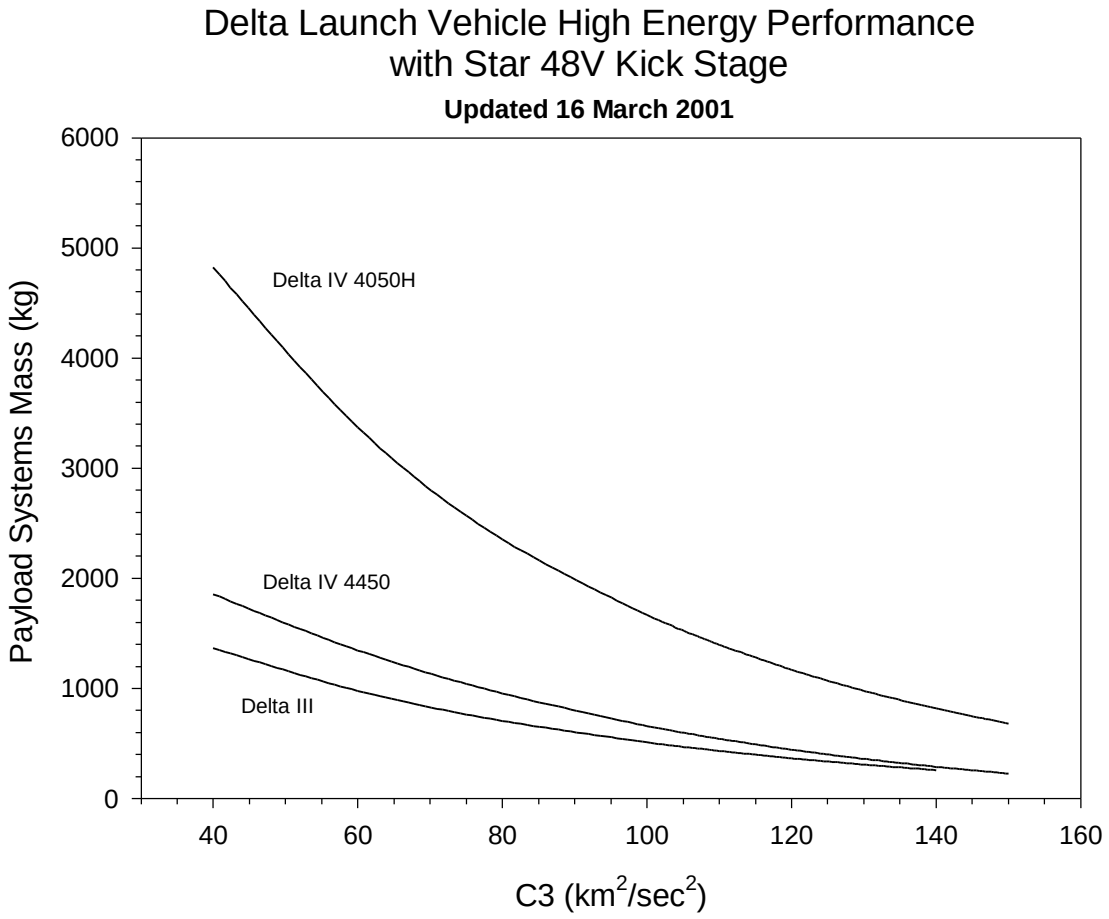


Ground Rules

- Performance is expressed in terms of payload systems mass. Payload systems mass includes the spacecraft, adapter between the spacecraft and kick stage, and all kick stage hardware (avionics, attitude control system, structural support hardware, etc.). Payload systems mass does not include the mass of the Star 48V motor itself (propellant grain, case assembly, nozzle assembly, TVA system, internal insulation, and liner). Kick stage design is assumed to be the responsibility of the spacecraft project.
- Performance shown is intended for planning purposes only. Actual performance will depend heavily on mission specific requirements and kick stage design. These data do not represent a mission specific contractual commitment.
- Performance shown reflects 3 sigma mission performance margin, plus additional reserves as determined by the launch service provider. No NASA/KSC reserves, or any other mission specific reserves (i.e., launch window), have been applied.
- These data are valid for declinations between –28.5° and 28.5°. Declinations outside this range will result in a performance loss.
- Payload fairings:
    - Atlas IIIB: 4 m Large Payload Fairing (LPF)
    - Atlas V 401: 4 m Extended Payload Fairing (EPF)
    - Atlas V 5X1: 5 m Short Payload Fairing (C-SPF)

Figure 3: Launch Vehicle Performance- Atlas III/V Family w/ Kick-stage

These Fig. 4 Curves are NEW INFORMATION as of 16-Mar-01!!



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- These data are valid for declinations between –28.7° and 28.7°. Declinations outside this range will result in a performance loss.
- Payload fairings:
    - Delta III 3940: 4 m x 11 m
    - Delta IV 4450: 5 m x 14 m
    - Delta IV 4050H: 5 m x 19 m

Figure 4: Launch Vehicle Performance- Delta III/IV Family w/ Kick-stage

Launch Services Cost Figures to be used for Evaluation Purposes

Intermediate Launch Service Class

Delta III and Delta IV 4040
Atlas IIIB, 401

FY02	FY03	FY04	FY05	Total
$24	$37	$34	$5	$100

EELV-Medium Launch Service Class

Delta IV 4240 and 4450
Atlas V 501, 511, 521, 531, 541, and 551

FY02	FY03	FY04	FY05	Total
$32	$47	$45	$6	$130

EELV-Heavy Launch Service Class

Delta IV 4050H

FY02	FY03	FY04	FY05	Total
$39	$59	$56	$6	$160

All costs are estimated in real-year dollars (order year = L-30) based on current NLS contracts information.
Assumes 12/01/04 launch date from CCAFS
Costs include a nominal allocation for Mission Unique options/peculiar services, a nominal Spacecraft Launch-Site Processing and Telemetry Support Costs, and estimated costs for mission unique modifications and support for nuclear materials.
These cost figures do not include the cost for development and flight hardware for a Kick-stage, if required

Table 1: Launch Services Cost Figures to be used for Evaluation Purposes

Figure 5. Representative Launch Vehicle Integration and Processing Schedule